Remarks

Claims 1-16 remain pending after the amendment. No new matter is added. Amendments have been made to the independent claims to clarify the claims and to recite that "the arrangement of colors along the line not being formed of symmetrical patterns." This is supported in the specification at least by the last sentences of paragraphs 0052 and 0053 and in Fig. 2.

A description of one embodiment of the claimed structure and method is provided in paragraphs 0018-0020 of the specification. Fig. 2 also illustrates the invention, where the set of light emitters (e.g., LEDs) is the highlighted 17 emitters, not being formed of symmetric patterns. The subsets are red (3 reds), blue (5 blues), and green (9 greens). The relative numbers of light emitters are selected based on the desired overall color point (e.g., color temperature) of the illuminator. For a display backlight, the color point will typically be a white point.

Since there are only three red emitters, those three red emitters are first positioned at substantially equal distances. In Fig. 2, the red emitters are separated by five positions.

The next fewest number of emitters is blue, with five emitters. The blue emitters are positioned at substantially equal distances in the unoccupied positions. In Fig. 2, the blue emitters are separated by two or three positions.

The next fewest number of emitters is green, with nine emitters. The green emitters then fill the unoccupied positions, which is as equidistant as possible given the available positions.

The resulting arrangement is formed without symmetric patterns of colors so that the resulting white point (or other combined color) can be achieved without the restriction of forming symmetric patterns, and the combined color is uniform color across the illuminator.

Claims 1, 10, and 12 apply to three or more subsets (colors).

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Drawings

The examiner objected to the drawings since the inventions of Claims 3 and 13 were not shown in the drawings. The specification has been amended to point out how Fig. 2 shows an embodiment of Claims 3 and 13. The blue emitter at position 13 that is spaced only two positions away from a neighboring blue emitter has a lower than average luminous output, while the blue emitter at position 6 that is spaced three positions away from a neighboring blue emitter has a higher than average luminous output.

Therefore, the drawings illustrate the invention of Claims 3 and 13. No new matter has been added since paragraphs 0027, 0044, and 0060 fully described Claims 3 and 13 and are redundant with the description added to paragraph 0060.

Objection to Claims

The examiner objected to certain language in the independent claims as being unclear. The offending language has been clarified in the amendment.

Rejection of Claims

The examiner rejected all independent Claims 1, 10, and 12 as either being anticipated by or made obvious by Hoelen (US 2002/0167016).

Hoelen discloses repeating patterns of colored LEDs in a backlight. For any pattern exceeding two emitters, the pattern is symmetric. For example, Fig. 2A shows a repeating pattern of GBRBG LEDs. Fig. 2B shows the pattern of GBRRGB. Fig. 2C shows the pattern GBRGRBG. Fig. 4A shows the pattern GB. Fig. 4B shows the pattern BRRB. Fig. 4C shows the pattern BRRRB. Fig. 4D shows the pattern BBRBB. Fig. 5A shows the pattern (GB)R(GB), where (GB) is a green-blue color. Fig. 5B shows the pattern R(GB)(GB)R. And Fig. 5C shows the pattern (GB)R(GB)R(GB).

In all instances for patterns exceeding two emitters, the Hoelen pattern is a symmetric pattern. Disadvantages of symmetrical positioning of the colors is described in Applicant's specification in paragraphs 0003 and 0004. The disadvantages include poor color uniformity. Further, symmetric patterns force the designer to use only the relative number of color emitters that fit into the symmetric pattern even if a more optimal relative number is desired.

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For example, if the symmetric pattern is GBRBG and the entire line of emitters is 20, Hoelen could not add any number of red, blue, or green LEDs to achieve the desired whitepoint; Hoelen is limited to only adding the number of red, blue, or green LEDs that can create a symmetric pattern. Thus, the resulting white point will not be precise.

Applicant's Claim 1 is very different from the teachings of Hoelen.

Firstly, Applicant's Claim 1 requires that "the arrangement of colors along the line not being formed of symmetric patterns." All of Hoelen's arrangements exceeding two emitters are symmetric patterns of colors. In order to create a precise overall white point for a backlight, the various numbers of red, green, and blue LEDs may be such that the colors cannot be arranged in symmetric patterns. Since Hoelen has no means of forming arrangements of colors other than in symmetric patterns, Hoelen cannot optimize the relative numbers of red, green, and blue LEDs. Hoelen's symmetric pattern technique restricts the achievement of a desired white point.

Secondly, Applicant's Claim 1 requires that there be at least three different color light emitters in each set with at least three light emitters of the same color within each subset of light emitters. Thus, Hoelen's patterns in Figs. 4A, 4B, 4C, 4D, 5A, 5B, and 5C are not particularly relevant since there are only two colors in the pattern. The remaining patterns in Hoelen's Fig. 2 will be discussed.

Applicant's Claim 1 further recites:

> the light emitters of the subset with the fewest number of light emitters being assigned to respective substantially equidistant positions along the the line of N positions, the subset with the fewest number of light emitters being a first subset,
>
> the light emitters of the subset with the second fewest number of light emitters being assigned to respective substantially equidistant positions along the the line of N positions which are not yet occupied by the first subset, the subset with the second fewest number of light emitters being a second subset,
>
> the light emitters of the subset with the third fewest number of light emitters being assigned to respective substantially equidistant positions along the the line of N

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positions which are not yet occupied by the first subset or the second subset, the subset with the third fewest number of light emitters being a third subset, except, if the third subset has the greatest number of light emitters in the set, those light emitters in the third subset are assigned to the positions which are not yet occupied.

In Hoelen's Fig. 2A, the pattern GBRBG repeats, so a set of light emitters may be GBRBG GBRBG GBRBG GBRBG. Since Hoelen is simply providing symmetrical patterns, Hoelen's color arrangement along a line is predetermined and not an iterative process, in contrast to Claim 1. If, in order to create a certain backlight white point, two more blues had to be added to a line of 20 light emitters, Hoelen would be unable to do it since Hoelen requires symmetrical patterns. This same rationale applies to all of Hoelen's patterns. In contrast, in Applicant's Claim 1, the two blue emitters would be accommodated without loss of color uniformity.

The remaining independent Claims 10 and 12 are distinguished for the same reasons given for Claim 1.

Accordingly, Applicant's inventions of Claims 1, 10, and 12 are distinguished for Hoelen's teachings for a number of reasons. The differences allow Applicant's illuminator or backlight to better match a desired white point since the colors in the line need not form symmetric patterns, and there is improved color uniformity in the combined light output.

The examiner is invited to call Applicant's attorney at 408-382-0480 x202 for further discussion.

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I hereby certify that this paper is being facsimile transmitted to the U.S. Patent and Trademark Office on the date shown below.

Signature 4/18/05 Date

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